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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003906200 for a patent by SCALZO AUTOMOTIVE RESEARCH P/L as filed on 11 November 2003.

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ENGINE MECHANISM.

This invention relates to an internal combustion engines mechanism to achieve a practical Atkinson Cycle motion in which the power and exhaust stroke, of a four-stroke cycle, is substantially longer than the induction and compression stroke. An Atkinson Cycle is acknowledged to contribute substantially to fuel economy improvements in motor vehicle applications.

An Atkinson Cycle mechanism for in-line engine arrangement is described in Provisional Patent Application No.2003904582. It is the objective of this invention to describe the invention in its application to V-type engines. Further fuel economy improvements can be achieved with the mechanism allowing the compression ratio to be varied during operation and thus also allowing turbochargers and supercharges to be used for optimum performance and economy.

The V-type Atkinson Cycle engine is essentially constructed in the same manner as the V-type Variable Stroke Engine described in Provisional Patent Application No. 2003906092. It is intended that only the components that convert the Variable Stroke Engine to an Atkinson Cycle Engine be described in full by reference to the accompanying drawings.

In the drawings:

Figure 1 is a partial isometric view of one pair of piston/crank assembly of a multi-piston V-type engine. The crankcase, head and other conventional engine components are not shown.

Figure 2 is an isometric view of the rotating control shaft showing the two eccentrics that control the motion of the piston stroke.

Figure 3 is an end view of the control shaft of Figure 2, showing the relative position of the two eccentrics set at 90 degrees from each other.

Referring to Figs. 1 and 2 of the drawings, an internal combustion engine 10 defining cylinder bores 14 and 15 in a "V" formation mounted on a cylinder block, not shown. The cylinders 14 and 15 are closed at one end by cylinder heads, which are provided with the usual inlet and exhaust port, valves, actuating gear and ignition means, none of which are shown.

Piston assembly 16 moves in bore 14 and connects to the rocking member 18 via connecting rod 20 and a pair of parallel links 22. Connecting rod 20 is pivotally connected to the piston 16 via gudgeon pin 24, and pivotally connected to the links 22 via pin 26. The other end of the links 22 is pivotally linked to the rocking member 18 by pin 28 fixed on either side of the rocking member 18. The axes of pins 24, 26 and 28 are parallel to each other. Rocking member 18 is pivotally supported at two places on rotating control shaft 30 in a selected geometric position longitudinal along the engine block (not shown), and parallel to the engine crankshaft 32 and all of the pins 24, 26 and 28. Control shaft 30 rotatable on bearings (not shown) within the engine block webs separating the cylinder bores 14 and 15 and crankshaft 32 with conventional main bearings (not shown). Control shaft 30 has eccentric 34 on which the big end of connecting rod 36 is rotatably mounted and provide connection to links 22 via pin 38.

Similarly, piston assembly 17 moves in bore 15 and connects to the rocking member 18 via connecting rod 21 and a pair of parallel links 23. Connecting rod 21 is pivotally connected to the piston 17 via gudgeon pin 25, and pivotally connected to the links 23 via pin 27. The other end of the links 23 is pivotally linked to the rocking member 18 by

common pin 28 fixed on either side of the rocking member 18. The axes of pins 25, 27 and 28 are parallel to each other. Rocking member 18 is jounalised on control shaft 30 and straddles all the components of the oscillating mechanism to provide a strong connection to the crankshaft 32 via pin 28 and connecting rod 40. Connecting rod 29 is rotationally connected to control shaft 30 on eccentric 35 connecting to links 23 via pin 31.

The two banks of cylinders in a multi-cylinder engine represented by bores 14 and 15 are displaced from each other to allow parallel assembly of the two links 22 and 23 on a common pin 28.

The rocking member 18 connects to the crankshaft 32 via connecting rod 40, pin 28 fixed at either end to the rocking member 18, and crankpin 44. Thus the linear motion of pistons 16 and 17 is transferred to the crankshaft 32 via connecting rods 20 and 21, links 22 and 23, rocking member 18, control shaft 30 with eccentrics 34 and 35, connecting rods 36 and 29, and connecting rod 40.

Control shaft 30 is located at a suitable position along a vertical centerline between the two bores 14 and 15 and is driven at half the speed of crankshaft 32 by a suitable geared, chain or belt drive (not shown), preferably in the same rotational direction of crankshaft 32. Eccentric 35 of control shaft 30 is set at 90 degrees trailing eccentric 34 of the control shaft 30, refer to Figure 3, if the rotation of control shaft 30 is in the same direction as the crankshaft.

Control shaft 30 has the added function of concentrically supporting the oscillating rocking member 18.

By introducing variable timing between the control shaft 30 and crankshaft 32 (in a similar manner to a variable valve timing mechanism in conventional engines) the

characteristics of the Atkinson Cycle can be altered as desired, as well as having the ability to alter the compression ratio, further improving the efficiency of the engine.

The scope of the invention need not be limited to the mechanism shown, variations in the positioning of the crankshaft, the rocking member and linkage geometries to achieve the same outcome, fall within this invention.

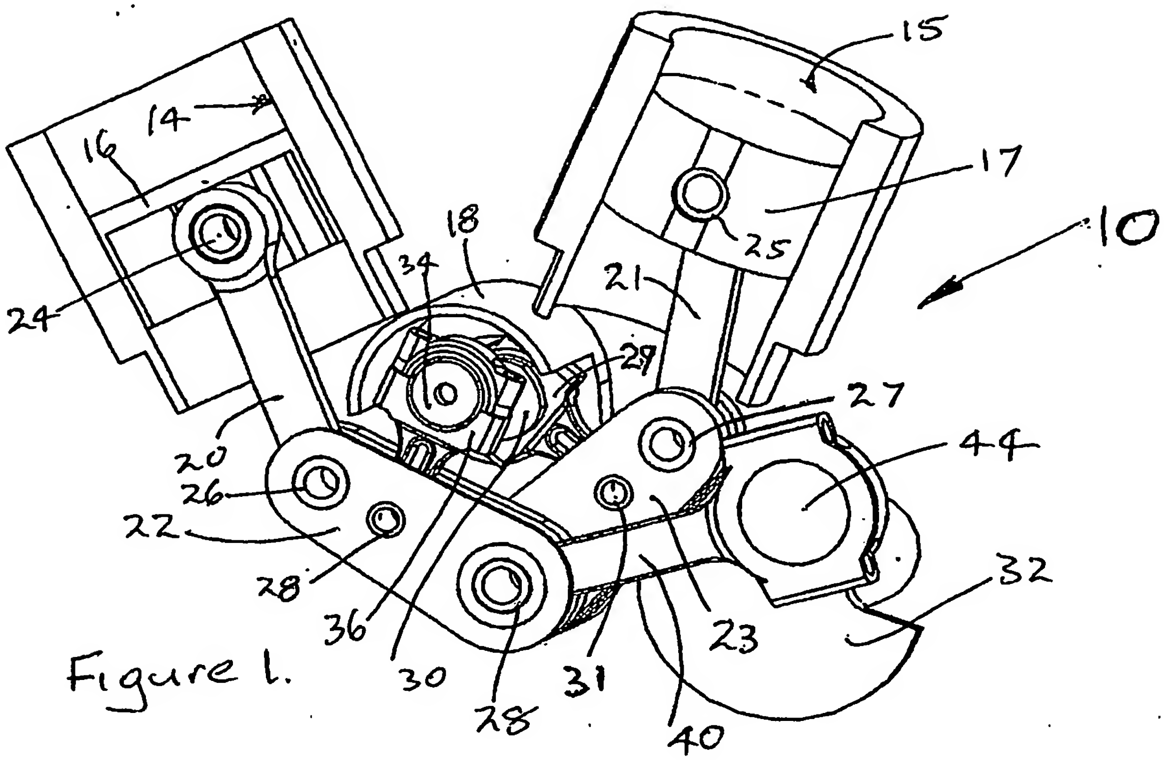

Figure 1.

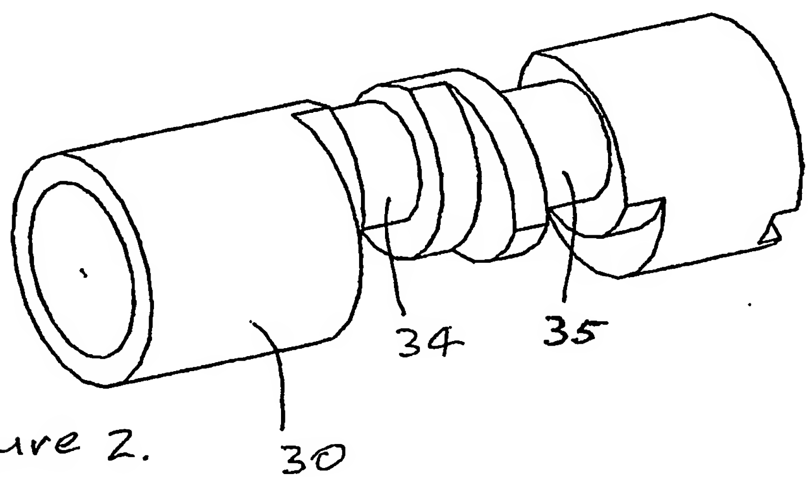

Figure 2.

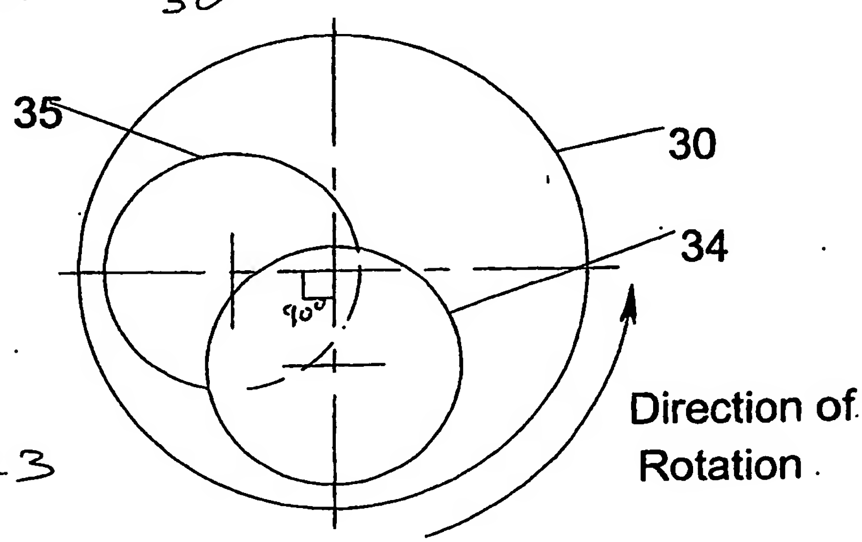

Figure 3